

## ABSTRACT

### YELLOW PHOSPHOROUS POISONING(RATOL)-ROLE OF N-ACETYL CYSTEINE AND POSTMORTEM TOXICOLOGICAL FINDINGS – A PROSPECTIVE STUDY

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#### BACKGROUND :

Ratol is a rodenticide (rat killer paste) ,it contains yellow phosphorus, a severe local and systemic toxin causing damage to gastrointestinal, hepatic, cardiovascular, and renal systems. Among these liver is the most commonly affected organ and acute liver failure with coagulopathy is the most dreaded complication. Other fatal complications are acute tubular necrosis, hepato-renal syndrome, hypotension and arrhythmias. Clinical manifestations of yellow phosphorous poisoning has three stages. First stage has gastrointestinal symptoms like nausea and vomiting in the absence of any laboratory abnormalities. Second stage occurs after 24–48 hours characterised by rising transaminases, although the patient may be asymptomatic. In some cases, this progresses to the third stage characterised by acute liver failure with coagulopathy and encephalopathy, which can be fatal. The Role of N acetyl cysteine (NAC) in acetaminophen induced Acute fulminant hepatic failure (ALF) was well established. Additionally some studies have shown that NAC may be useful in non-acetaminophen induced ALF like yellow phosphorous poisoning also. These toxins damages the liver by depleting glutathione stores. NAC acts by stimulate the glutathione synthesis and enhances glutathione transferase activity . Therefore, treatment with NAC, which is inexpensive and relatively safe, would be a viable treatment option for patients admitted with yellow phosphorous consumption with ALF but those who are not eligible for liver transplant. A post-mortem liver biopsy shows hydropic or fatty infiltration of hepatocytes, collapsed reticulin framework with fibrosis between the hepatocytes and periportal necrosis suggestive of an acute fulminant hepatitis

## AIMS AND OBJECTIVES:

Aim of our study was to identify the prevalence of yellow phosphorus poisoning in our hospital, evaluate the usefulness of N-Acetyl cysteine in yellow phosphorous poisoning and Postmortem toxicological findings in liver and kidney.

## METHODS:

SETTING: Department of general medicine, Government Rajaji Hospital, Madurai Medical College. INCLUSION CRITERIA: All patients admitted with history yellow phosphorous poison (ratol) consumption at Government Rajaji Hospital & Madurai Medical College during the period of June to September 2017. EXCLUSION CRITERIA: Patient who have ingested other substance in addition to yellow phosphorous, Patients who are known to have preexisting liver disease, chronic kidney disease, heart disease and absconded within 24hrs of admission. DESIGN OF STUDY: Prospective cross sectional hospital based observational study. PERIOD OF STUDY 4 months (June 2017 to September 2017). PARTICIPANTS: The study was conducted on 25 patients with history yellow phosphorous poison (ratol) consumption who fulfill the inclusion and exclusion criteria getting admitted at Government Rajaji Hospital & Madurai Medical College during the period of June to September 2017. The control group patients are taken from retrospective data obtained in year 2016 at GRH, who had similar management protocol except for NAC use. METHODOLOGY: History was taken from patients who consumed yellow phosphorous poisoning, about time and amount of consumption, any prior hospital admission and treatment before arrived to our hospital. History regarding details and duration of alcohol intake was taken, and history of vomiting, abdominal pain, loose stools, altered sensorium also noted. Clinical examination about presence of icterus, anemia, edema legs, features of encephalopathy, abdominal tenderness was noted during admission. After stomach wash and initial resuscitation, Loading dose of 140 mg/kg of N Acetyl cysteine was started and then followed by 17 doses, each at 70 mg/kg, given 4th hourly. The total duration of the treatment course is 72 hours. Time of stomach wash and initiation of N Acetyl cysteine was noted. Serial monitoring of vitals and complete blood count, blood sugar, urea, creatinine, serum bilirubin, AST, ALT, prothrombin time, INR, urine analysis, ECG, USG abdomen was estimated. Post-mortem toxicological findings of liver and kidney was noted in all expired patients.

## RESULTS:

In our study we included 50 patients admitted with history yellow phosphorous poison(ratol) consumption at Government Rajaji Hospital . Out of 50 patients 25 were study group those who were treated with N Acetyl cysteine (NAC) and another 25 patients were taken from retrospective data collected from those who not treated with NAC. Our study showed that most vulnerable age group of yellow phosphorous (ratol) poisoning was 15 to 25 years, More than 60% of the victims were females. Calculated Leathal dose of YP was  $>1\text{mg/kg}$ . This study also told that,80% of the admitted patients are consumed more than 1gm of poison .Most of the patients were admitted with vomiting ,abdominal pain, on 3rd day pt developed icterus ,feature of hepaic encephlopathy,bleeding manifestation,hypotension ,tachycardia and oliguria ,some patients had respiratory failure also. Approximately 20% of the patients in the study group and 50% in the control group had features of hepatic encephalopathy,hypotension and oliguria . 3/4 of patients in the both group had elevated LFT value,remaining 1/4 of patients are near normal LFT, probably they not consumed poison or very minimal consumption. Among 25 patients ,14 reaches our hospital within 24hrs of poison consumption so NAC initiated early ,Remaining patients are admitted in peripheral hospital and refered later after developing features of toxic hepatitis. In the study group 17 patients have good response to NAC, among their 8 patiens have elevation of LFT (bilirubin,AST,ALT,prothrombin time) mostly in the 3rd and 4th day of admission. That LFT values become near normal on 6th or 7th day due to timely treatment with NAC . It is statistically more significant ( p value is 0.001) . In the study group among 25 yellow phosphorous consumed patients, 8patients (32% ) died inspite of NAC treatment mostly due to delayed admission with features of acute liver failure. In the control group 17 patients (68% )died . So treatment with NAC reduces 50% of mortality. It is statistically more significant (p value is 0.024 ).

## CONCLUSION:

Most patients admitted with history of suicidal consumption of ratol (yellow phosphorous) were young and belonged to poorer socio-economic sections. Mortality was reduced to 50% in the study group who was admitted early and treated with NAC, eventhough they consumed lethal dose of ratol. Therefore treatment with NAC, which is inexpensive and relatively safe, would be a viable treatment option for patients admitted with ratol consumption.

KEY WORDS: Yellow phosphorous, ratol, N acetyl cysteine